MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2021/2022

BMM1014 – MATHEMATICS FOR MANAGERS

(All Sections/Groups)

12 AUGUST 2022
3.00 p.m - 5.00 p.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 6 pages with 4 questions only.
2. Attempt all **FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.
4. Formulae are attached at the end of the question paper.

QUESTION 1

a) The XYZ Company has a fixed cost of RM20000 and a production cost of RM12 for each unit produced. The selling price of each unit of product is RM20.

i. Find the break-even point for the firm.

(3 marks)

ii. Compute the profit or loss corresponding to the production level of 2000 and 3000 units.

(3 marks)

b) A company receives RM45 for each unit sold. It has a variable cost of RM25 per item and a fixed cost of RM1600.

i. Find the break-even quantity of the company.

(3 marks)

ii. What is its profit if it sold 75 and 150 items, respectively?

(3 marks)

c) Souvenir hats, T-shirts and jackets are sold at a rock concert. Seven hats, three T-shirts and one jacket cost RM986. Nine hats, five T-shirts and three jackets cost RM1722. Ten hats, six T-shirts and five jackets cost RM2289. Find the prices of the individual items.

(13 marks)

(Total: 25 Marks)

Continued...

QUESTION 2

Vanz Polar Products makes downhill and cross-country skis. A pair of downhill skis requires 2 man-hours for cutting, 1 man-hour for shaping and 3 man-hours for finishing while a pair of cross-country skis requires 2 man-hours for cutting, 2 man-hours for shaping and 1 man-hour for finishing. Each day the company has 140 man-hours for cutting, 120 man-hours for shaping and 150 man-hours for finishing. A pair of downhill skis yields a profit of RM10, and a pair of cross-country skis yields a profit of RM8.

a) Formulate the above problem as a Linear Programming problem. (5 marks)

b) Graph and show the feasible region of the above problem clearly. (6 marks)

c) How many pairs of each type of ski should the company manufacture to obtain maximum profit? What is the associated maximum profit? (10 marks)

d) Will the optimal solution change if the profit for each pair of cross-country skis increases to RM12? If so, what is the new optimal solution and what is the associated profit? (4 marks)

(Total: 25 Marks)

Continued...

QUESTION 3

a) Find the effective rate corresponding to the nominal rate of 6%/year compounded monthly.

(4 marks)

b) Paul deposited RM3000 in a simple interest account 3 years ago. He has earned RM360 in interest so far. What is the interest rate for his account?

(4 marks)

c) Find the accumulated amount if the principal RM6500 is invested at the interest rate of 7%/year for 12.5 years compounded semi-annually. Round your answers to two decimal places.

(4 marks)

d) Find the interest rate needed for an investment of RM17000 to become RM34000 in 10 years if interest is compounded continuously.

(6 marks)

e) Alex has deposited RM50 into a retirement account every month. The account earns interest at the rate of 6.2% per annum compounded monthly. How much money will be in the account at the end of 20 years?

(7 marks)

(Total: 25 Marks)

Continued...

QUESTION 4

a) If x represents a laptop, the weekly profit function (in hundred RM) for a shop selling laptops is given by

$$P(x) = -3x^2 + 24x - 10$$

Find the level of x that maximises the laptop shop's profit and the maximum profit.
(9 marks)

b) A Retro Music promoter produces two types of guitars. The total profit (in thousands of RM) is given by

$$P(x, y) = -10x^2 + 6xy - 1.5y^2 + 44x - 6y + 20$$

where x denotes hundred guitars of type A and y denotes hundred guitars of type B produced and sold. How many of each type of guitars must be produced and sold in order to maximize profit? What is the maximum profit realizable?
(11 marks)

c) Find the integral below:

$$\int 3(3x + 4)^6 dx$$

(5 marks)

(Total: 25 Marks)

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LIST OF FORMULA

1. Quadratic Formula

The solution of the equation:
$ax^2 + bx + c = 0$,
$a \neq 0$, are $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

2. Simple Interest

Interest, $I = Prt$ (P = principal, r = interest rate, t = number of years)
Accumulated amount, $A = P(1 + rt)$

3. Compound Interest

Accumulated amount, $A = P(1 + i)^n$, where $i = r/m$, and $n = mt$ (m = number of conversion periods per year)

4. Continuous Compound Interest

$A = Pe^{rt}$

5. Effective Rate of Interest

$r_{eff} = (1 + r/m)^m - 1$

6. Present Value for Compound Interest

$P = A(1 + i)^{-n}$

7. Future Value of an Annuity

$$S = R\left[\frac{(1+i)^n - 1}{i}\right]$$

(S = future value of ordinary annuity of n payments of R dollars periodic payment)

8. Present Value of an Annuity

$$P = R\left[\frac{1-(1+i)^{-n}}{i}\right]$$

(P = present value of ordinary annuity of n payments of R dollars periodic payment)

Continued...

9. Amortization Formula

$$R = \left[\frac{Pi}{1 - (1 + i)^{-n}} \right]$$

(R = periodic payment on a loan of P dollars to be amortized over n periods)

10. Sinking Fund Formula

$$R = \left[\frac{Si}{(1 + i)^{n} - 1} \right]$$

(R = periodic payment required to accumulate S dollars over n periods)

11. Break-even point = $\frac{\text{Fixed Cost}}{\text{Contribution per unit}}$ (Contribution per unit = unit selling price – unit variable cost)

Sales (unit) = $\frac{\text{Fixed cost + Target profit}}{\text{Contribution per unit}}$

Calculus

12. Product rule

$$f(x) = u(x).v(x)$$

$$f'(x) = u(x).\frac{dv}{dx} + v(x).\frac{du}{dx}$$

13. Quotient rule

$$f(x) = \frac{u(x)}{v(x)}$$

$$f'(x) = \frac{v(x)\frac{du}{dx} - u(x)\frac{dv}{dx}}{[v(x)]^2}$$

End of Paper